



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND
TOXIC SUBSTANCES

Memorandum

DATE:

SUBJECT: Benefits assessment for diazinon use in hops: impact of cancellation

FROM: Nicole Mosz, Agronomist
Herbicide and Insecticide Branch

Arthur Grube, Senior Economist
Economic Analysis Branch
Biological and Economic Analysis Division (7503C)

THROUGH: David Brassard, Senior Entomologist
Arnet Jones, Chief
Herbicide and Insecticide Branch

David Widawsky, Chief
Economic Analysis Branch
Biological and Economic Analysis Division (7503C)

TO: John Hebert, Chemical Review Manager
Susan Lewis, Chief
Reregistration Branch 2
Special Review and Reregistration Division (7508C)

CC: Denise Keehner, Director
Biological and Economic Analysis Division (7503C)

Reviewed by BEAD Peer Review Panel: July 17, 2002

Summary of Analysis

Diazinon is used in hops to control the hop aphid. Effective alternatives exist for control of the hop aphid. The alternative insecticides will cost from \$10 to \$20 per acre more than diazinon. This is less than 1% of average gross revenue per acre. Since diazinon is estimated to presently be used on about 7,000 acres of hops the total cost impact to hop growers would be between \$70,000 and \$140,000 out of \$125,000,000 if there is a phase-out.

Scope and limitations of this assessment

The scope of this analysis comprises an examination of potential regional-level and industry-wide impacts associated with elimination of the use of diazinon in hops. This analysis does not examine the effects of other regulatory actions such as longer worker reentry intervals. This analysis assumes that the alternative insecticides, bifenthrin and pymetrozine, remain available for use on hops and remain efficacious.

Background of US hop production

The majority of hops grown in the United States are produced in Washington, Oregon, and Idaho. The hop plant (*Humulus lupulus*) is a perennial grown on trellises, usually spaced 3.5 feet by 14 feet or 7 feet by 7 feet. Hop plants are vegetatively propagated and a trellis must be constructed due to the climbing nature of the plant. Hop plants are generally productive for 10 to 15 years before replanting occurs. The female hop plant produces the cone, which is harvested from late August until early October. The hop cone is then processed for use as a flavoring agent in beers and ales (Crop Profile for WA, 2001).

Approximately 35,000 acres of hops are grown in the United States. Yields are somewhat less than 1,900 pounds per acre with a total crop value of about \$125,000,000 (Attachment 1).

Diazinon usage on hops

Pesticide usage data for hops is limited. The National Center for Food and Agricultural Policy estimated that 63% of hops were treated with diazinon in 1992 and about 20% were treated in 1997 (Attachment 2).

Insect Pests targeted by diazinon, and potential alternatives

Diazinon is used as an early season spray for the hop aphid (*Phorodon humuli*), a major pest of hops. The hop plant is a secondary host of the hop aphid. Aphids migrate to hops from May through July, where several generations of aphids can occur. The hop aphids feed on water and nutrients from the plant and excrete honeydew. Sooty mold develops on the honeydew, which, along with aphid infestation, decreases quality. Hop cones infested with sooty mold are unmarketable and must be destroyed (Univ. of Idaho, 2001; Crop Profile for WA, 2001).

Many predators and parasitoids are available for biological hop aphid management. Although the natural enemies often do not adequately reduce hop aphid populations, efforts are being made to integrate biological and chemical control. Methods such as applying insecticides to the soil or using chemicals that

specifically target the hop aphid can reduce the impacts on the natural enemies of the hop aphid. (Univ. of Idaho, 2001).

Once the principal pesticide used for hop aphid, diazinon is now used primarily for resistance management. Diazinon use has already declined in recent years due to the availability of alternatives. A decrease in the efficacy of diazinon due to a decrease in residual control has also contributed to the decline of diazinon use (George, 2002). In Idaho, diazinon is used on about 50% of the acreage because it is less expensive than other available chemicals, and because Idaho has not had the same problems with diazinon efficacy as in other areas (Barbour, 2002).

Alternatives to diazinon include imidacloprid, bifenthrin, and pymetrozine. Malathion is registered for use but is not efficacious. Virtually all of the Washington hops acreage is currently treated with imidacloprid. In 2001, Washington, Oregon, and Idaho were granted a 24(c) to apply imidacloprid through drip irrigation and through shanked-in applications to limit the negative impacts on mite predators (Crop Profile for WA, 2001). Bifenthrin is effective on the hop aphid and will kill some mites, but causes an increase in mite populations. Bifenthrin is efficacious on other insect pests, such as lepidopterans, and is likely to be used when these populations rise (Crop Profile for WA, 2001; George, 2002). Pymetrozine was recently registered for use on hops and is a good alternative to diazinon. The mode of action is specific to aphids, and although it may not be as efficacious as some of the alternatives, it is less toxic to aphid and mite predators, making this chemical effective in an IPM program (George, 2002).

Biological impacts of eliminating diazinon in hops production

Without the use of diazinon, growers are likely to substitute bifenthrin or pymetrozine. Imidacloprid, another alternative, is already widely used and is not likely to be a substitute for diazinon. Yield and quality losses are considered to be negligible due to the availability of efficacious alternatives (George, 2002).

Economic impacts of eliminating diazinon in hops production

Since alternative insecticides are available, the principal impact on hop growers will be an increase in production costs. Assuming all three insecticides are applied at the maximum allowable label rate an application of diazinon costs about \$10 per acre while bifenthrin will cost about \$20 per acre and pymetrozine will cost about \$30 per acre. Revenue per acre for hops is about \$3,500. The cost increase from using an alternative insecticide will be less than 1% of gross revenues.

Conclusion

Negligible impacts are expected without the use of diazinon on hops. Adequate alternatives are available for use.

Sources

Barbour, Jim. Idaho. Personal communication with Nicole Mosz on May 9, 2002.

Crop Profile for Hops in Oregon, November 23, 1999. Web address:
<http://pestdata.ncsu.edu/cropprofiles/docs/orhops.html>

Crop Profile for Hops in Washington, August 2001. Web address:
<http://pestdata.ncsu.edu/cropprofiles/docs/wahops.html>

George, Ann. Administrator, Washington Hops Commission. Personal communication with Nicole Mosz on May 7, 2002.

University of Idaho. Hops and Hop Pest Management, August 15, 2001. Web address:
<http://beta.parma.uidaho.edu/hops/>

Attachment 1

Hops: Area Harvested and Yield in the United States,
1999-2001

--							
State		:	Area Harvested			:	Yield
:-----							
	:	1999	:	2000	:	2001	:
:-----							
		:	----- Acres -----			:	----- Pounds -----
ID	:	3,362	:	3,321	:	3,469	:
OR	:	5,822	:	5,819	:	6,103	:
WA	:	25,076	:	26,980	:	26,339	:
US	:	34,260	:	36,120	:	35,911	:
	:	1,980	:	1,937	:	1,928	:
	:	34,260	:	36,120	:	35,911	:
	:	1,881	:	1,871	:	1,861	:
:-----							

* Unknown or none.

Hops: Production in the United States, 1999-2001

--							
State		:	Production				
:-----							
		:	1999	:	2000	:	2001
:-----							
		:	1, 000 Pounds				
ID	:	4, 734. 0	:	4, 929. 8	:	4, 609. 3	
OR	:	10, 072. 0	:	10, 387. 0	:	11, 443. 2	
WA	:	49, 650. 0	:	52, 260. 0	:	50, 779. 6	
US	:	64, 456. 0	:	67, 576. 8	:	66, 832. 1	
:-----							

* Unknown or none.

Hops: Price per Pound and Value of Production,
by State and United States, 1999-2001

--													
	:	Price per Pound			:	Value of Production							
State	:												
:-----													
	:	1999	:	2000	:	2001	:	1999	:	2000	:	2001	
:-----													
--													
	:	Dollars			-----			1,000 Dollars			-----		
ID	:	1.61		1.78		1.61		7,622		8,775		7,421	
OR	:	2.04		2.20		2.41		20,547		22,851		27,578	
WA	:	1.63		1.81		1.83		80,930		94,591		92,927	
	:												

US	:	1. 69	1. 87	1. 91	109, 099	126, 217	127, 926
----	---	-------	-------	-------	----------	----------	----------

Gross Revenue per acre:					3, 184	3, 494	3, 562
-------------------------	--	--	--	--	--------	--------	--------

--

Attachment 2

Usage of Diazinon on Hops in 1992 and 1997

Treated State	Acres Grown	Percent Treated	Acres Treated	Acres Grown	Percent Treated	Acres
	1992	1992	1992	1997	1997	1997
IDAHO	4,118	90	3,706	3,781	90	
3,403						
OREGON	7,190	100	7,190	8,354	25	
2,089						
WASHINGTON	28,245	50	14,123	31,861	10	
3,186						
3 STATE TOTAL	39,553	63	25,019	43,996	20	
8,678						